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Flood risk zonation in the farahzad basin (Tehran) using Fuzzy model

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Extended abstract

1- Introduction

Flood event is very important in humanities center and urban because they are effective on Capabilities production of runoff in this area and increase the financial and human losses due to its population density and infrastructure. As respects Collection and dispose of runoff from the rainfall in the river stream in fact are safety, public health and utilities and several flood events in Tehran that in some instances are financial losses and damages to human lives indicate necessity integrate study are about flood in the basins upstream of Tehran.

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So the purpose of this study determines areas with highest flood risk in the Farahzad basin. Basin Farahzad is located in upstream of the city of Tehran and the area is 22.29 km2. It is located in latitude '47 ◦ 35 to '5 ◦ 35 north and longitude '19 ◦ 51 to '21 ◦ 51 east. Considering the fact that phenomena as flooding are affected by many factors that these factors are not certain and exact and these are affecting probabilistic and inconclusive, so a method to Fuzzy model used for the areas in the flood risk.

2- Methodology

According to research purposes, data and information layers slope, profile and planimetric curvatures, elevation, drainage density, distance from the river, landforms and land use were assigned as effective parameters to flooding. To prepare the these data and layers are used the Tajrish

topography map with scale 1:50000, NI 39-3 number, K551 Series, page 2661I, Tehran geology map with scale 1:100000, Tehran Resource evaluation and land capability map scale with 1:250000, satellite image landsat ETM+ and satellite image IRS-LISS III**.**

To analyze satellite images, according to the capabilities Erdas software used according to the capabilities of this software in image processing and modeling also full adaptation with the ArcGIS software**.**

After providing information's mentioned above and determining kind of their relation with the flood appoint membership function for each of the parameters. After applying membership function to layers in Arc GIS software, all layers have values between zeros to one, then layers entered to fuzzy model. To perform fuzzy technique, it is necessary to use operators as union, Subscription, Gama, algebraic multiplication and sum. In this research Gama, algebraic multiplication and sum is used. In this study used Gama, algebraic multiplication and sum operators. First algebraic sum and multiplication operators applied to the layers which amount of membership is determined, then to find the final map of flood zonation and to adjust prepared maps according to algebraic sum and multiplication are used Gama 0.9, Gama 0.7 and Gama 0.5 operators, more over because field data was not existed to determine the most appropriate Gama in flood zonation, amount of correlation between primary info layers and Gama final maps are concluded in SPSS software**.**

3-Discossion

Gama 0.7 Map has had the highest correlation with the primary info layers, therefore Gama 0.7 Map chose as the final map of flood zonation which is classified in to five levels according to natural break method. Zones with very high risk of flood are located in downstream parts of the basin. Upstream parts of the basin and ridges are provided zones with low risk. As a matter of fact risk of flood becomes more if we move from the upstream parts of the basin to the downstream or south. Most area of the region is related to the zones with low risk of the flood which has 14.29 square kilometers area and smallest area is related to zones with very high risk of flood (0.78 square kilometers) and high risk (1.37 square kilometers)**.**

Valleys with concave slopes have the most effective surfaces to produce flooding zones in the basin. These surfaces mostly have slope between 0 to 20 percent and height between 1600 to 1950 meters and located between 0 to 1300 meters distances from rivers. Drainage density of this area is between 6 to 9. These surfaces mostly are located in the Units valley with mid slope and these are covered with trees and plants. Ridges and crests with concave slopes have the lowest effective surfaces to produce flooding zones in the basin. These surfaces mostly have slop between 40 to 60 percent and height between 2300 to 2650 meters and located between 130 to 260 meters distance from rivers. Drainage density of this area is more between 0 to 3.

These surfaces are mostly located in mountainous units with high slop and covered with pastures**.**

4-Conclusion

With considering final maps of flood zonation and along of static development, construction should be stopped in very high and high risk zones, more over it is Recommended to change the place of traditional restaurants located in this area which did not consider river bank to level with 1700 meters elevation which is computed of final map overlaying with topographic map**.**

Results show the capability and efficiency of this model to flood zonation and probable mistakes and differences occurred in other maps is determined in this model which related to various methods of layers of fuzzy production and the kind of Gama operator. The other property of this model is its capability to use in Arc GIS software.

Key words: zonation, flooding, fuzzy, Farahzad, risk.

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